

CLAIMS

1. A method for the interconnection of active components (21) and passive components (22) provided with terminals (211, 221) for their interconnection,
5 characterized in that it comprises:

- positioning and fixing (11) at least one active component and one passive component on a flat support (23), the terminals being in contact with the support,
- 10 - depositing (12) a polymer layer (24) on all of the support and said components,
- removing the support (14),
- redistributing the terminals (15) between the components and/or toward the periphery by means of
15 metal conductors (26) arranged in a predetermined layout, making it possible to obtain a reconstituted heterogeneous structure,
- heterogeneously thinning (16) said structure by nonselective surface treatment of the polymer layer
20 and at least one passive component (22).

2. The method as claimed in claim 1, furthermore comprising a step (13) of rectifying said polymer layer (24) prior to the step of redistributing the terminals, making it possible to calibrate the
25 thickness of the layer to a predetermined value and render the surface of said layer substantially flat and parallel to the support (23).

3. The method as claimed in claim 2, wherein the rectification comprises a first step of
30 heterogeneously thinning the layer by nonselective surface treatment of the polymer layer and at least one passive component.

4. The method as claimed in one of the preceding claims, wherein the surface treatment is
35 carried out by nonselectively lapping and polishing the polymer layer and the components.

5. The method as claimed in one of the preceding claims, wherein the support consists of an

adhesive film and the removal is carried out by peeling the film.

6. The method as claimed in one of the preceding claims, wherein the redistribution of the terminals comprises depositing a photo-etchable insulating layer (25), etching said layer in a pattern corresponding to the positioning of the terminals (211, 221), depositing a metal layer and etching said metal layer according to the predetermined layout of the metal conductors (26).

7. The method as claimed in one of the preceding claims, comprising a prior step (10) of thinning the passive components.

8. The method as claimed in claim 7, wherein, at least one passive component being a ceramic capacitor (30) with a zone of even and odd interdigitated electrodes (31, 32), two ceramic filling zones (33, 34) on either side of the electrode zone and two lateral end terminals (35) to which the even and odd electrodes are respectively connected, the prior thinning step consists in thinning one of said ceramic zones in a plane parallel to the electrodes.

9. The method as claimed in claim 7, wherein, at least one passive component being a ceramic capacitor (30) with a zone of even and odd interdigitated electrodes (31, 32), two ceramic filling zones (33, 34) on either side of the electrode zone and two lateral end terminals (35) to which the even and odd electrodes are respectively connected, the prior thinning step consists in thinning on one of its faces perpendicular to the plane of the electrodes.

10. The method as claimed in one of claims 7 to 9, wherein, at least one passive component being a resistor (40) or an inductor with an inert substrate (41), an active layer (42) on one face of said substrate and conductive terminals (43) enclosing the side faces of the component on either side of the active layer, the prior thinning step consists in thinning said substrate (41), the face bearing the

active layer (42) being next to the support during the positioning of the passive components on the support.

11. The method as claimed in one of the preceding claims, wherein, at least one passive
5 component being a MEMS (27) with a sensitive part (271) in contact with metal contacts (274) and etched in a substrate (272), it comprises:

- positioning and fixing said substrate on the support (23) via an interface (273) with two faces
10 having a first and second metal contact (275, 276) which are connected together and respectively placed on the face next to the support (23) on which the interface is fixed and on the opposite face, said second contact (276) being connected to the metal
15 terminals (274) of the substrate (272) by connecting wires (277),

- positioning and fixing a protective cover (270) of the MEMS on the support.

12. The method as claimed in one of the preceding claims, wherein, the active and passive
20 components being arranged on the support in order to form a set of identical patterns, it furthermore comprises cutting (17) the thinned heterogeneous structure around said patterns, making it possible to
25 obtain a corresponding number of identical thinned heterogeneous elementary components.

13. A method for the three-dimensional interconnection of active and passive components provided with terminals for their interconnection,
30 comprising:

- producing (50) at least two thinned heterogeneous elementary components (60) by the method as claimed in claim 12, the terminals being redistributed in particular toward the periphery,

35 - stacking and bonding (51) said heterogeneous components,

- coating (52) the stack with the aid of a polymer material,

- cutting (53) said material in order to form, around said stack, a parallelepipedal block whose faces will expose the peripheral contacts of said active and passive components,

5 - depositing (54) a metallization layer (71) on at least a part of said faces,

- forming (55) an interconnection network of the conductors by laser etching the metallization layer (71) on the faces of said block.

10 14. A thinned heterogeneous component, characterized in that it comprises a polymer layer (24) having two substantially plane and parallel surfaces with one polished face and one unpolished face and, coated in said layer, at least one active component
15 (21) and one passive component (22), the components having two faces, a first face provided with terminals (211, 221) for interconnection of the components, the terminals of the set of components being connected by metal conductors forming a flat support in contact with
20 the unpolished surface of said layer, and a second face, said second faces of the set of passive components being polished so as to form a plane surface homogeneous with said plane surface of the polymer layer.

25 15. A three-dimensional thinned heterogeneous component comprising at least two thinned heterogeneous components (60) as claimed in claim 14 stacked on one another, separated by a layer (63) and having conductors (601) connected to the terminals of the
30 active and passive components of each of the heterogeneous components and extending to the faces of the stack, and connections arranged on the faces of the stack for interconnection of the conductors.

35 16. A three-dimensional thinned heterogeneous component as claimed in claim 15, wherein said layers (60) are anisotropic conductive films and one or more of said thinned heterogeneous components (60) comprise passive components of the connecting wire (20) type for

connecting said thinned heterogeneous components to other stacked thinned heterogeneous components (60).

17. A method for the three-dimensional interconnection of active and passive components provided with terminals for their interconnection, characterized in that it comprises:

- positioning and fixing, on a plane support, at least one passive component (80) and at least a first active component (81), the terminals (801, 811) being in contact with the support, and a terminal adapter (84), said adapter having metal contacts (841, 842) on two faces which are connected to each other, one of the faces being in contact with said support and the other face lying on the other side,

- stacking and bonding a second active component (82) on said first active component, the terminals (821) of said second component being on the opposite face from that in contact with the first component,

- forming connections by connecting wires (822) between the terminals of the second component and the contacts of the adapter,

- depositing a polymer layer (85) on all of the support and said components,

- removing the support,

- redistributing the terminals between the components and/or toward the periphery by means of metal conductors, making it possible to obtain a reconstituted heterogeneous structure,

- heterogeneously thinning said structure by nonselective surface treatment of the polymer layer and the passive components.

18. The method as claimed in claim 17, furthermore comprising stacking and bonding at least one other active component (83) on said second active component, the terminals (831) of each further component being on the opposite face from that in contact with the lower component, and forming connections by connecting wires (832) between the

terminals (831) of each further component and the contacts (842) of the adapter (84) or the terminals (841) of the lower component (82).